(54) **PORTABLE TELEPHONE**

(57)   A portable telephone is designed to control generation of musical tones and/or incoming call sound in response to classes of telephone numbers by which incoming calls are to be received. That is, the portable telephone stops generating musical tones while generating incoming call sound in response to telephone numbers of the first class; or it gradually decreases musical tones in tone volume in response to telephone numbers of the second class. In response to telephone numbers of the third class, the portable telephone continues generating musical tones without interruption while automatically disconnecting the line without generating incoming call sound.

FIG. 1

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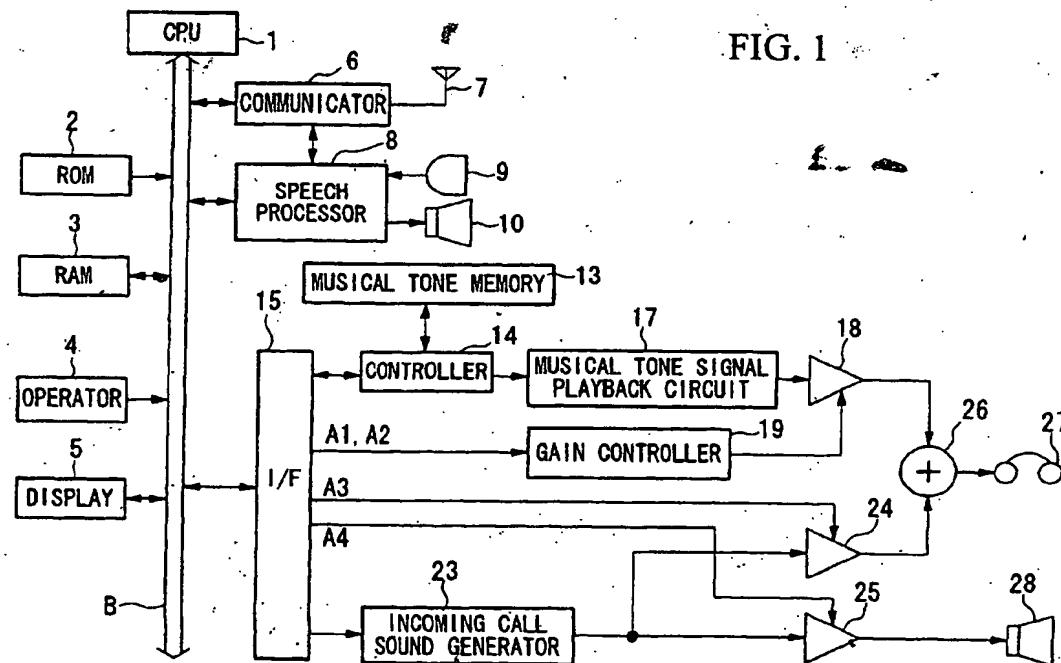
Description

Technical Field

[0001] This invention relates to portable telephones that have musical tone playback functions in addition to portable telephone functions.

Background Art

[0002] Recently, electronic distribution systems have been widely recognized by general users or subscribers of portable telephones, so that melody sounds are downloaded and distributed to portable telephones as incoming call sounds over communication networks. In the future, it is expected that plenty of portable telephones provide musical tone playback circuits to play back musical tones of prescribed musical tunes that have rich expressions in music compared with simple incoming call sounds. For example, it is possible to develop portable telephones incorporating MP3 (namely, MPEG Audio Layer 3) decoders, to which MP3 data are distributed as audio contents. Thus, portable telephones incorporating MP3 decoders can be used as new music playback devices that substitute for the existing portable cassette tape players, for example.

[0003] It is naturally expected that users of portable telephones, which can be used as music playback devices, tend to regard musical tone playback functions important rather than original portable telephone functions. In addition, it is considered that users, particularly young users, may incline to listen to the music played back rather than human speech over phone communication. Such tendency will be increased in the future because all users do not always feel happy to receive phone calls at all times, in other words, some users may refuse to receive phone calls from unwelcome or undesirable persons with whom they do not want to communicate over the phones.

[0004] This invention is made in consideration of the aforementioned circumstances, so it is an object of the present invention to provide a portable telephone that is capable of controlling tone volume of played back musical tones and turning on or off playback of musical tones in response to the property of a calling party, which may be represented by calling party communication data automatically transmitted to a called party, such as the significance, priority, and personality of the calling party.

Disclosure of Invention

[0005] This invention is applicable to portable telephones having both of portable telephone functions and musical tone playback functions. Herein, this invention provides a portable telephone that controls generation of musical tones and/or incoming call sound in response to classes of telephone numbers by which incoming calls are to be received. That is, prescribed telephone numbers are stored in advance in connection with classes, which are determined in consideration of the significance, priority, and personality of calling parties. In response to the telephone number of the first class, the portable telephone stops generating musical tones but generates incoming call sound to notify a user of reception of an incoming call from an important person such as a chief in his/her company. In response to the telephone number of the second class, the portable telephone gradually decreases musical tones in tone volume while generating incoming call sound to notify the user of reception of an incoming call from a preferable person such as a friend. In response to the telephone number of the third class, the portable telephone continues generating musical tones without generating incoming call sound, wherein it also sends a prescribed voice message to a calling party such as an unwelcome person with whom the user does not want to communicate over the phone, then, it automatically disconnects a line connected with the calling party.

[0006] Thus, it is possible to provide flexible manners for controlling generation of musical tones and/or incoming call sound in consideration of the classes of the telephone numbers that are listed in advance.

Brief Description of Drawings

[0007]

    FIG. 1 is a block diagram showing an electronic configuration of a portable telephone in accordance with a preferred embodiment of the invention.

Best Mode for Carrying Out the Invention

[0008] This invention will be described in further detail by way of examples with reference to the accompanying drawing.

[0009] FIG. 1 shows an electronic configuration of a portable telephone in accordance with a preferred embodiment of the invention. Herein, reference numeral 1 designates a central processing unit (CPU); 2 designates a read-only memory (ROM) that stores programs run by the CPU; and 3 designates a random-access memory (RAM) that stores various types of data and has battery backup. In addition, reference numeral 4 designates an operator section that provides keypads of a ten-key unit for allowing entry of telephone numbers and function keys; and 5 designates a display that is constituted by a liquid crystal display.

[0010] Further, reference numeral 6 designates a communicator coupled with an antenna 7. The communicator 6 transmits signals and data by modulation using carrier waves via the antenna 7, and it receives via the antenna 7 incoming signals and data, which are demodulated and are forwarded to the CPU 1 or a speech processor 8. The speech processor 8 converts speech sig-

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nals output from a microphone 9 to digital data, which are compressed and are then forwarded to the communicator 6 as transmission data. In addition, the speech processor 8 converts speech data output from the communicator 6 to analog speech signals, which are forwarded to a speaker 10.

[0011] Reference numeral 13 designates a musical tone memory that stores digital musical tone data. It is possible to share functions of the musical tone memory 13 with the RAM 3. A read/write controller 14 performs read/write controls on the musical tone memory 13. That is, under the control of the controller 14, musical tone data are written to the musical tone memory 13 by way of a bus line B and an interface circuit (I/F) 15; or musical tone data are read from the musical tone memory 13 and are forwarded to a musical tone signal playback circuit 17. The musical tone signal playback circuit 17 receives the musical tone data by way of the controller 14 to convert them to analog musical tone signals, which are forwarded to an amplifier 18.

[0012] The amplifier 18 amplifies the musical tone signals output from the musical tone signal playback circuit 17. That is, the amplifier 18 is constituted as a gain-controlled amplifier whose control terminal receives the output of a gain controller 19. The gain controller 19 receives signals A1, A2 from the CPU 1 by way of the bus line B and interface circuit 15 so as to produce a control signal for controlling the gain of the amplifier 18. Thus, the control terminal of the amplifier 18 receives the control signal output from the gain controller 19 based on the signals A1, A2 given from the CPU 1. Herein, the gain controller 19 controls the amplifier 18 such that its gain is set to '0' if both the signals A1, A2 are '0'; or the gain controller 19 controls the amplifier 18 such that its gain is set to '1' if both the signals A1, A2 are '1'. When the signals A1, A2 are respectively set at '1' and '0', the gain controller 19 controls the amplifier 18 such that its gain gradually decreases from '1' to '0'.

[0013] An incoming call sound generator 23 generates incoming call sound signals, representing sounds that inform the user or subscriber of reception of incoming calls, in accordance with instructions given from the CPU 1. The incoming call sound signals are supplied to amplifiers 24 and 25 respectively. The amplifiers 24 and 25 are constituted as gain-controlled amplifiers whose control terminals respectively receive signals A3 and A4 from the CPU 1. The output of the amplifier 24 whose gain is controlled in response to the signal A3 is forwarded to a mixer 26, while the output of the amplifier 25 whose gain is controlled in response to the signal A4 is forwarded to a speaker 28. The mixer 26 mixes together outputs of the amplifiers 18 and 24 to produce mixed signals, which are forwarded to headphones 27.

[0014] Next, operations and functions of the portable telephone will be described in accordance with the present embodiment. The portable telephone of the present embodiment is designed to have functions of a music player as well as functions of a portable telephone

terminal.

[0015] First, a description will be given with respect to portable telephone functions of the portable telephone of the present embodiment. In this case, the CPU 1 outputs signals A1, A2, A3, and A4 that are respectively set to '0', '0', '0', and '1'. Thus, only the amplifier 25 acts as an amplifier whose gain is '1', while the other amplifiers 18 and 24 are shut off because of gain '0'.

[0016] At reception of an incoming call, the communicator 6 receives incoming call signals via the antenna 7, so that the incoming call signals are demodulated to produce incoming call data, which are forwarded to the CPU 1. Upon receipt of the incoming call data, the CPU 1 stores into the RAM 3 a telephone number of a calling party while it also issues an incoming call sound generation instruction to the incoming call sound generator 23. Upon receipt of the incoming call sound generation instruction, the incoming call sound generator 23 generates incoming call sound signals, which are forwarded to the amplifier 25. The amplifier 25 amplifies the incoming call sound signals to be forwarded to the speaker 28. Thus, the speaker 28 produces incoming call sound.

[0017] The portable telephone rings the incoming call sound to notify a user or subscriber (namely, called party) of reception of an incoming call from the calling party. Then, the user presses a call reception button (not shown) on the operator section 4 to answer the phone. At this time, the CPU 1 detects depression of the call reception button to issue an incoming call sound stop instruction to the incoming call sound generator 23 while it also issues a call connection instruction to the speech processor 8 and communicator 6. Thus, a call line is established and connected with the calling party, so that the called party of the portable telephone is able to speak with the calling party. Herein, the microphone 9 converts the user's speech to speech signals, which are transmitted to the calling party by means of the communicator 6 and antenna 7 over the connected line. In addition, the speech of the calling party is transmitted to the portable telephone so that the speech processor 8 converts the corresponding speech data to speech signals, which are forwarded to the speaker 10. Thus, the user is able to listen to the speech of the calling party by the speaker 10.

[0018] Next, a description will be given with respect to music playback functions of the portable telephone that acts as a music player. In this case, the user operates the portable telephone to make a call to a music download center that is located in the prescribed facility. Herein, the user operates the portable telephone to designate a desired musical tune and requests the music download center to download it thereto. The music download center distributes all musical tunes in the prescribed format of digital musical tone data. The portable telephone receives from the music download center the digital musical tone data of the desired musical tune that is distributed from the music download center. Thus, the CPU 1 stores into the RAM 3 the digital musical tone

data distributed to the portable telephone. Incidentally, the RAM 3 is capable of storing digital musical tone data of multiple musical tunes therein. After completion of distribution, the user operates prescribed keys of the operator section 4 to designate one of the musical tunes stored in the RAM 3 and instructs playback of the designated musical tune.

[0019] The user's instruction for the playback of the musical tune is acknowledged by the CPU 1 to output signals A1, A2, A3, and A4 that are set to '1', '1', '1', and '0' respectively. In response to these signals A1 to A4, the amplifiers 18 and 24 act as amplifiers whose gain is '1', while the amplifier 25 is shut off. Next, the CPU 1 reads from the RAM 3 the digital musical tone data of the designated musical tune, which are forwarded to the controller 14. The controller 14 writes the digital musical tone data given from the CPU 1 to the musical tone memory 13. Then, the CPU 1 issues a music playback instruction to the controller 14. Upon receipt of the music playback instruction, the controller 14 reads from the musical tone memory 13 the digital musical tone data, which are sequentially forwarded to the musical tone signal playback circuit 17. The musical tone signal playback circuit 17 forms analog musical tone signals based on the digital musical tone data output from the controller 14. The musical tone signals are forwarded to the headphones 27 by way of the amplifier 18 and mixer 26. Thus, the headphones 27 produce musical tones corresponding to the musical tone signals.

[0020] Next, a description will be given with respect to reception of an incoming call from a calling party during playback of musical tones.

[0021] To cope with incoming calls during playback of musical tones, the user of the portable telephone stores in advance prescribed telephone numbers in the RAM, wherein the telephone numbers are listed in consideration of specific persons from whom the user have possibilities of receiving calls. Herein, the telephone numbers are divided into groups (or classes), namely, A, B, and C as follows:

    A: important persons such as teachers, seniors and chiefs in one's company.
    B: family members, relatives, friends and colleagues in one's company.
    C: unwelcome persons with whom the user does not want to communicate over the phone.

[0022] When the portable telephone receives an incoming call, the CPU 1 stores the telephone number of a calling person in the RAM 3. Next, the CPU 1 compares the telephone number of the calling person with the prescribed telephone numbers that are stored in the RAM 3 in connection with the aforementioned groups A, B and C respectively. That is, the CPU 1 checks the telephone number of the calling person with the prescribed telephone numbers stored in the RAM 3 in advance. If the telephone number matches the prescribed tele-

phone number belonging to the group A, the CPU 1 outputs signals A1, A2, A3, and A4 that are set to '0', '0', '1', and '1' respectively; then, it outputs an incoming call sound generation instruction. When the CPU 1 outputs the signals A1-A4 corresponding to '0,0,1,1', the amplifier 18 is shut off to terminate generation of musical tones by the headphones 27, while the amplifiers 24 and 25 act as amplifiers whose gain is '1'. In addition, the CPU 1 outputs the incoming call sound generation instruction to the incoming call sound generator 23, which in turn generates incoming call sound signals. The incoming call sound signals are delivered to the headphones 27 and speaker 28 by way of the amplifiers 24 and 25 respectively.

[0023] As described above, when the portable telephone receives an incoming call from the person whose telephone number is listed in the group A during playback of musical tones, the portable telephone immediately stops producing musical tones by the headphones 27, but it generates incoming call sound by both the headphones 27 and speaker 28.

[0024] If the portable telephone receives an incoming call from a person whose telephone number is listed in the group B during playback of musical tones, the CPU 1 outputs signals A1, A2, A3, and A4 that are set to '1', '0', '1', and '0' respectively; then, it outputs an incoming call sound generation instruction. When the CPU 1 outputs the signals A1-A4 corresponding to '1,0,1,0', the amplifier 18 is gradually decreased in gain from '1' to '0' so that the musical tones generated by the headphones 27 are gradually decreased in tone volume, while the amplifier 24 acts as an amplifier whose gain is '1' but the amplifier 25 is shut off. Upon receipt of the incoming call sound generation instruction, the incoming call sound generator 23 generates incoming call sound signals, which are delivered to the headphones 27 by way of the amplifier 24.

[0025] As described above, when the portable telephone receives an incoming call from the person whose telephone number is listed in the group B during playback of the musical tones, the portable telephone gradually decreases musical tones in tone volume, while it also generates incoming call sound by the headphones 27. This reduces unpleasant feeling of the user that may be caused by interruption due to the incoming call during playback of the musical tones.

[0026] If the portable telephone receives an incoming call from a person whose telephone number is listed in the group C, the CPU 1 accesses to the ROM 2 to read and reproduce prerecorded voice message data, which correspond to a voice message as follows:
    "Now, the user is unable to answer the phone."
That is, the CPU 1 reads from the ROM 2 the aforementioned voice message data, which are forwarded to the speech processor 8. Then, the voice message data are transmitted to the calling person by the communicator 6 and antenna 7. Thereafter, the portable telephone disconnects a line connected with a telephone terminal of

the calling person. In this case, the portable telephone automatically sends the prescribed voice message to the calling person without terminating playback of musical tones. In addition, the portable telephone does not generate incoming call sound that may obstruct the user from listening to musical tones played back. Further, the portable telephone automatically disconnects the line connected with the 'unwelcome' calling person whose telephone number is listed in the group C.

[0027]   If the portable telephone receives an incoming call from a person whose telephone number is not listed in any of the groups A, B, and C, the CPU 1 outputs signals A1, A2, A3, and A4 that are set to '1', '1', '1', and '1' respectively; then, it outputs an incoming call sound generation instruction. When the CPU 1 outputs the signals A1-A4 corresponding to '1,1,1,1', all the amplifiers 18, 24 and 25 continuously act as amplifiers whose gain is '1'. Therefore, the headphones 27 continuously generate musical tones based on musical tone signals supplied thereto by way of the amplifier 18. In addition, the incoming call sound generator 23 generates incoming call sound signals, which are delivered to the headphones 27 and speaker 28 by way of the amplifiers 24 and 25 respectively. Thus, both the headphones 27 and speaker 28 produce incoming call sound to notify the user of reception of an incoming call from an unknown person whose telephone number is not listed in any of the groups A, B, and C.

[0028]   That is, when the portable telephone receives an incoming call from the unknown person whose telephone number is not listed in advance, the portable telephone simultaneously proceeds to playback of musical tones and generation of incoming call sound by the headphones 27.

[0029]   Lastly, this invention has a variety of effects and technical features, which are described below:

(1) This invention provides a portable telephone having a musical tone playback function, wherein at reception of an incoming call, a telephone number of a calling person is checked against prescribed telephone numbers of calling parties that are listed in advance in a storage, so that playback of musical tones is controlled in response to the check result. Herein, it is possible to control musical tones in tone volume, and turn on or off playback of musical tones in consideration of the significance of calling parties whose telephone numbers are designated by calling party communication data.

(2) Playback of musical tones is controlled in response to classes (or groups) of telephone numbers of calling parties. For example, musical tones are decreased in tone volume or stopped in response to classes of calling parties who actually call the user of the portable telephone. That is, the user is able to acknowledge the class of the calling party by sensing changes of musical tones played back by the portable telephone. In other words, it is pos-

sible to acknowledge the significance of the calling party who actually calls the user of the portable telephone.

(3) The portable telephone incorporates a controller that decreases musical tones in tone volume at reception of an incoming call from a classified calling party. Thus, it is possible to reduce unpleasant feeling of the user due to interruption during playback of musical tones.

(4) The portable telephone has a capability of automatically disconnecting the line connected with the telephone terminal of an unwelcome person with whom the user does not want to communicate over the phone. Thus, it is possible to reduce user's troubles in handling communication with the unwelcome person.

[0030]   As described heretofore, this invention is not necessarily limited to the foregoing embodiment, hence, it is possible to provide a variety of modifications without departing from the essential subject matter of this invention.

Claims

1.   In a portable telephone that contains an incoming call sound generator for generating incoming call sound, a line connection establisher for establishing a line connection with other telephone terminal, a communicator for performing communication by the established line connection, and a musical tone generator for generating musical tones of a prescribed musical tune, said portable telephone **characterized by** comprising:

a storage for storing in advance prescribed telephone numbers;
a telephone number checker for upon receipt of an incoming call from a calling party, checking a telephone number of the calling party with the prescribed telephone numbers stored in the storage: and
a musical tone controller for controlling the musical tone generator in response to a check result of the telephone number checker.

2.   A portable telephone according to claim 1, wherein the storage stores the prescribed telephone numbers in connection with a plurality of classes respectively, so that the musical tone controller controls the musical tone generator in consideration of the class to which the telephone number of the calling party belongs.

3.   A portable telephone according to claim 1, wherein the musical tone controller controls the musical tone generator such as to gradually decrease musical

tones in tone volume.

4. In a portable telephone that contains an incoming call sound generator for generating incoming call sound, a line connection establisher for establishing a line connection with other telephone terminal, a communicator for performing communication by the established line connection, and a musical tone generator for generating musical tones of a prescribed musical tune, said portable telephone **characterized by** comprising:

    a storage for storing in advance prescribed telephone numbers;
    a telephone number checker for upon receipt of an incoming call from a calling party, checking a telephone number of the calling party with the prescribed telephone numbers stored in the storage: and
    a line disconnecting section for inhibiting the incoming call sound generator from generating the incoming call sound while disconnecting a line connected with a telephone terminal of the calling party in response to a check result of the telephone number checker.

5. A portable telephone comprising:

    a storage for storing in advance a plurality of prescribed telephone numbers in connection with a plurality of classes respectively;
    an incoming call sound generator for generating incoming call sound upon receipt of an incoming call from a telephone terminal of a calling party;
    a musical tone generator for generating musical tones of a prescribed musical tune;
    a telephone number checker for checking a telephone number of the calling party with the prescribed telephone numbers stored in the storage; and
    a controller for controlling the incoming call sound generator and/or the musical tone generator in response to a check result of the telephone number checker.

6. A portable telephone according to claim 5, wherein when the telephone number of the calling party matches a prescribed telephone number belonging to a first class within the plurality of classes, the controller stops the musical tone generator generating the musical tones while activating the incoming call sound generator to generate the incoming call sound.

7. A portable telephone according to claim 5, wherein when the telephone number of the calling party matches a prescribed telephone number belonging

to a second class within the plurality of classes, the controller controls the musical tone generator to gradually decrease the musical tones in tone volume while activating the incoming call sound generator to generate the incoming call sound.

8. A portable telephone according to claim 5, wherein when the telephone number of the calling party matches a prescribed telephone number belonging to a third class within the plurality of classes, the controller controls the musical tone generator to continue generating the musical tones while inhibiting the incoming call sound generator from generating the incoming call sound.

9. A portable telephone according to claim 8 further comprising:

    a voice messenger for automatically sending a prescribed voice message to the calling party whose telephone number belongs to the third class; and
    a line disconnecting section for after sending the voice message, automatically disconnecting a line used for communication with the calling party.

Amended claims under Art. 19.1 PCT

    1. (Amended) In a portable telephone that contains an incoming call sound generator for generating incoming call sound, a line connection establisher for establishing a line connection with other telephone terminal, a communicator for performing communication by the established line connection, and a data reproducer for reproducing prescribed digital data that differ from incoming call sound data, wherein the incoming call sound generator provides a plurality of incoming call sound generation patterns as incoming call sound generation methods, and wherein the data reproducer provides a plurality of data reproduction patterns as digital data reproduction methods and comprises

    a first storage for storing in advance a plurality of telephone numbers;
    a second storage for providing a plurality of combinations between the plurality of incoming call sound generation patterns and the plurality of data reproduction patterns in response to prescribed incoming call notification priorities in advance such that each of the plurality of combinations is stored in correspondence with each of the telephone numbers stored in the first storage, and
    a telephone number checker for upon receipt of an incoming call, checking a telephone

number of a calling party with the telephone numbers stored in the first storage,

wherein in response to a check result of the telephone number checker, the incoming call sound generation method and the data reproduction method are realized by executing the incoming call sound generation pattern and the data reproduction pattern of the combination stored in the second storage in response to the incoming call notification priority.

2. (Amended) A portable telephone according to claim 1, wherein the first storage stores the prescribed telephone numbers in connection with a plurality of classes respectively, so that in consideration of the class to which the telephone number of the calling party belongs, the incoming call sound generation method and the data reproduction method are realized in response to the incoming call notification priority.

3. (Amended) A portable telephone according to claim 1, wherein the data reproducer comprises a musical tone generator for generating musical tones of a prescribed musical tune.

4. (Amended) A portable telephone according to claim 1 further comprising a line disconnecting section for inhibiting incoming call sound generation of the incoming call sound generator and for disconnecting the line connected with a communication terminal of the calling party.

5. (Amended) A portable telephone according to claim 1, wherein the first storage stores the prescribed telephone numbers in connection with a plurality of classes respectively, and wherein the data reproducer comprises a musical tone generator for generating musical tones of a prescribed musical tune, so that on the basis of the check result of the telephone number checker, the incoming call sound generator is controlled in response to the incoming call sound generation pattern, and the musical tone generator is controlled in response to the data reproduction pattern.

6. (Amended) A portable telephone according to claim 5, wherein when the telephone number of the calling party matches a prescribed telephone number belonging to a first class within the plurality of classes, the musical tone generator stops the musical tone generation, and the incoming call sound generator generates the incoming call sound.

7. (Amended) A portable telephone according to claim 5, wherein when the telephone number of the

calling party matches a prescribed telephone number belonging to a second class within the plurality of classes, the musical tone generator gradually reduces musical tones in tone volume, and the incoming call sound generator generates the incoming call sound.

8. (Amended) A portable telephone according to claim 5, wherein when the telephone number of the calling party matches a prescribed telephone number belonging to a third class within the plurality of classes, the musical tone generator continues generating musical tones, and the incoming call sound generator is inhibited from generating the incoming call sound.

9. A portable telephone according to claim 8 further comprising:

a voice messenger for automatically sending a prescribed voice message to the calling party whose telephone number belongs to a third class; and
a line disconnecting section for after sending the voice message, automatically disconnecting a line used for communication with the calling party.

FIG. 1
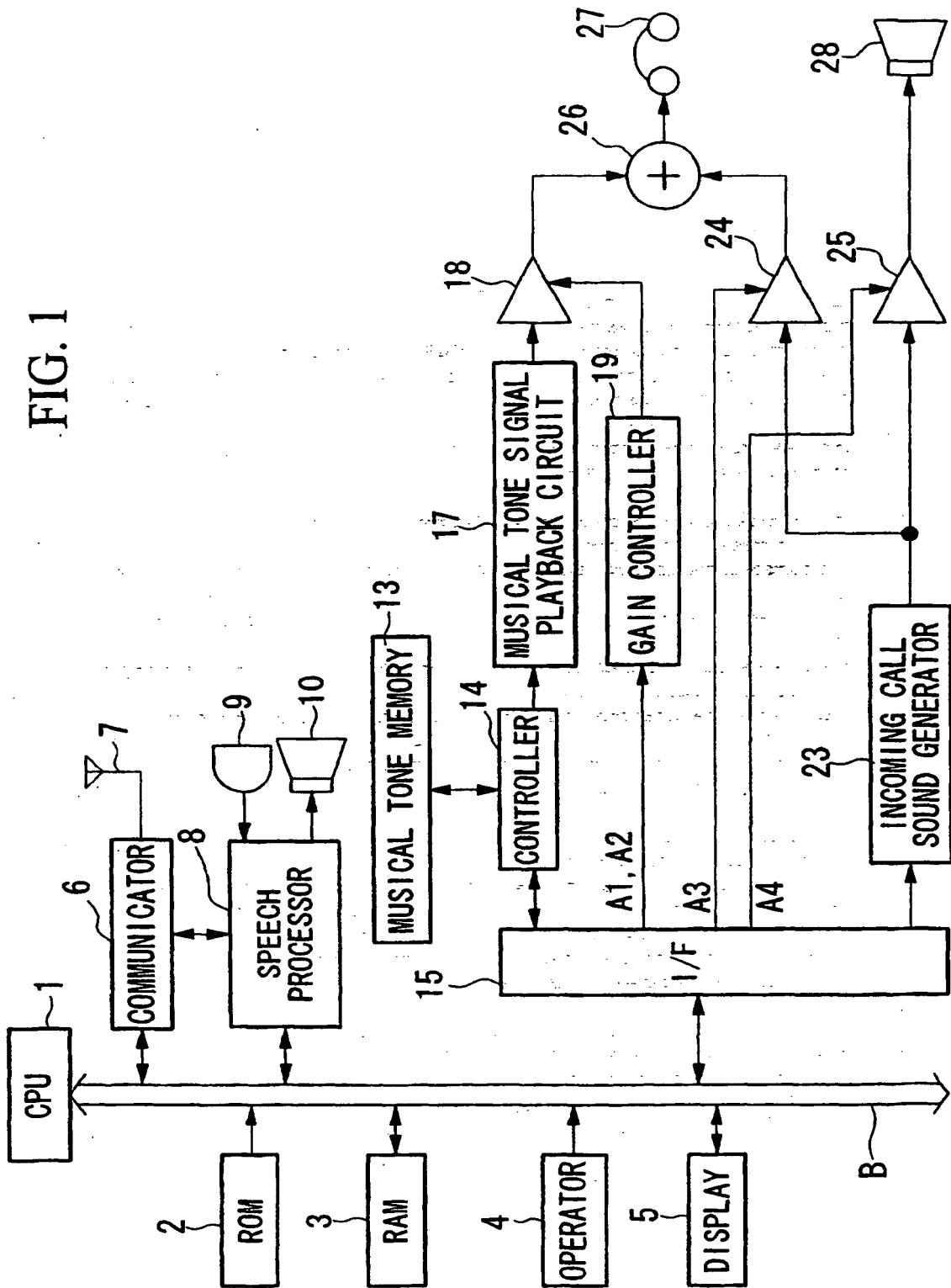
INTERNATIONAL SEARCH REPORT

	International application No.
	PCT/JP00/09413

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl^7 H04M1/00, H04M1/57

According to International Patent Classification (IPC) or to both national classification and IPC

B.   FIELDS SEARCHED
Minimum documentation searched (classification system followed by classification symbols)
Int.Cl^7 H04M1/00, H04M1/57, H04M1/725

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho	1922-1996	Toroku Jitsuyo Shinan Koho	1994-2001
Kokai Jitsuyo Shinan Koho	1971-2001	Jitsuyo Shinan Toroku Koho	1996-2001

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C.   DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP, 7-023081, A (Sharp Corporation), 24 January, 1995 (24.01.95),	1,2
Y	Par. Nos. [0005],[0016] (Family: none)	3,5-9
Y	JP, 8-125723, A (Toshiba Corporation), 17 May, 1996 (17.05.96), Claims 2, 3 & US, 5890071, A	3,5-9
Y	JP, 10-190789, A (Toshiba Corporation), 21 July, 1998 (21.07.98), Par. No. [0043]; Fig. 2 (Family: none)	3,5-9
X	JP, 11-252220, A (Sony Corporation), 17 September, 1999 (17.09.99),	4
Y	Par. No.[0007]; Fig. 1 (Family: none)	8,9
A	EP, 939497, A1 (GEN ENGINEERING CO., LTD.), 01 September, 1999 (01.09.99), Full text; Figs. 1-3 & JP, 10-173764, A & KR, 99073805, A	1-9

☒ Further documents are listed in the continuation of Box C.   ☐ See patent family annex.

*	Special categories of cited documents:
"A"	document defining the general state of the art which is not considered to be of particular relevance
"E"	earlier document but published on or after the international filing date
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"O"	document referring to an oral disclosure, use, exhibition or other means
"P"	document published prior to the international filing date but later than the priority date claimed

"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&"	document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
08 March, 2001 (08.03.01)	21 March, 2001 (21.03.01)

Name and mailing address of the ISA/	Authorized officer
Japanese Patent Office	
Facsimile No.	Telephone No.

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP00/09413

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US, 5694467, A (Hewlett Packard Company), 02 December, 1997 (02.12.97), Full text; Figs. 1-3 (Family: none)	1-9

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

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